

By this Amendment, independent Claims 1 and 44 have been amended.

Claim 1, as amended, is directed to a flexible composite membrane comprising a selected quantity of a polymeric material blended with a selected quantity of particulate material. The membrane includes a non-fiberized polymeric matrix wherein the particulate is substantially physically immobilized with the polymeric matrix and wherein the outer surface of the membrane comprises a selectively permeable skin. The subject matter of Claim 1 is neither shown nor suggested by the art of record for the reasons set forth below.

Turning first to Mahendran et al., it is noted that in the Office Action of March 15, 2000, the Patent Office indicated that "the features relied upon by the Applicant (i.e., without the need for chemical reaction") are not recited in the rejected claims. Applicants had previously argued that in contrast to the present invention, Mahendran et al. described alfa-alumina particles dispersed throughout the membrane and that the membrane described in Mahendran et al. was formed by chemically reacting the alfa-alumina particles with the polymer and hydrophillic agent. This was distinguished from the membrane of Claim 1 where the particulate material is physically held by and immobilized within the polymeric matrix without the need for a separate chemical

reaction.

Claim 1, as amended, now recites a membrane wherein the material is substantially and physically immobilized within the polymeric matrix. Accordingly, for the reasons set forth above, Claim 1 is novel and would not have been obvious in view of Mahendran et al.

With respect to the remaining references, namely, McAllister et al., Sugiyama et al. and Anderson et al., relied upon by the Patent Office, Applicants respectfully submit that none of these references disclose or even suggest a membrane wherein the outer surface of the membrane comprises a selectively permeable skin as recited and described in Claim 1.

In the membrane of the present invention, it is believed that more of the particulate material is distributed within the interior portion of the membrane than at or near the outer surfaces, thus effectively providing the membrane with a "skin" over the interior portion of the membrane (page 16, lines 24-36). This type of "skin" is neither disclosed nor suggested in the prior art of record.

The Patent Office states that McAllister et al. disclose a composite membrane comprising particulates, a non-fibrous matrix and a skin layer (see column 11, lines 45-59). The passage relied upon by the Patent Office (column 11, pages 45-59), however,

neither discloses nor suggests a skin layer as recited in Claim 1 of the present application. More specifically, in the passage relied upon by the Patent Office (column 11, pages 45-59), McAllister et al. states that:

The particle filled microporous material of the invention may be modified to produce a porous membrane having a gradient porosity therethrough. If the extruded film is rapidly cooled from one surface thereof immediately after extrusion, such as by bringing the surface into contact with a chilled casting wheel. The surface of the film in contact with, for example, the chilled casting wheel can be fused or sealed, while the opposite side remains porous. Orientation of this gradient porosity structure enhances the porosity differences from surface to surface. Films with such properties can be used, for example, for microfiltration or ultrafiltration or as a protective film or tape having, for example, the porous side readily markable and the sealed side resistant to marking (emphasis added).

Thus, McAllister et al. disclose a porous membrane having a "gradient porosity therethrough." Nothing in the cited passage of McAllister et al. discloses or even remotely suggests a skin layer where more of the particles are disposed within the interior of the polymeric matrix, thereby effectively providing a skin layer. The cited passage from McAllister et al. does not address the distribution of particles within the polymeric material. For this reason, Claim 1 would not be anticipated by nor would have been obvious in view of McAllister et al.

Turning now to Sugiyama et al., the Patent Office states that

"Sugiyama et al. disclose a membrane comprising particulates, a non-fibrous matrix and a skin layer (see column 3, lines 29-56)."
The Patent Office goes on to say that "skin or surfaces are formed when prepared by known methods of producing porous membranes."
Turning first to the cited passage (column 3, lines 29-56) of Sugiyama et al., that passage reads, in part, that:

"The adsorbent of this invention consists of a porous membrane containing an adsorbent in the form of powder or fine particle which is fixed on the support. This adsorber can be prepared by the known method of producing porous membranes as follows: a polymer solution containing the adsorbent disbursed therein is applied to the support by means of flow casting, dipping, coating or spraying and the dispersion is then placed into contact with a non-solvent for solidifying the polymer and extracting the solvent. The porous membrane containing the adsorbent is then fixed on the support. It is also possible to prepare the adsorber by applying a molten polymer containing the adsorbent and extractable additives dispersed therein to the support, solidifying the polymer and subsequently extracting the additives, thereby providing a porous membrane."

Sugiyama et al. further disclose the polymers suitable for use in the porous membrane and the percentage of the particulate material used in the membrane. However, nowhere in the cited passage nor/or in the remainder of the Sugiyama et al. patent is a "skin" layer (of the type recited in Claim 1) disclosed or even suggested.

Moreover, in Sugiyama et al., just below the passage cited by the Patent Office, it is stated that the porous membrane of

Sugiyama et al. is desired to have a specific thickness, because a thickness greater than the preferred thickness will prevent the adsorbent from uniformly dispersing inside the porous membrane, so that the density distribution will become uneven in some portions of the adsorber. Accordingly, it would appear that in Sugiyama et al., it is desirable that the particles be uniformly dispersed from one surface of the membrane to the opposite surface. Clearly, this is not the case with the membrane of Claim 1 wherein less particulate material near the outer surface of the membrane than the interior portion of the membrane provides the "skin." In this regard, Sugiyama et al. actually teach away from the membrane of Claim 1.

Turning now to Anderson et al., the Office Action does not provide any support in Anderson et al. for a disclosure or even a suggestion of a "skin" layer. In fact, the position of the Patent Office appears to rest only on the statement in the Office Action that "a skin layer may be interpreted as any exterior surface." Such a broad and conclusory statement cannot serve as the basis for rejecting a claim for obviousness, and certainly cannot serve to support a rejection based on lack of novelty. It is respectfully requested that the Patent Office provide some identifiable support in the reference for the rejection.

For these reasons, Applicants respectfully submit that the

membrane of Claim 1 is novel over the art of record and would not have been obvious over any of the cited references.

Claim 44, as amended is directed to a flexible composite sheet membrane having an interior portion and two outer facing surfaces. The membrane includes a selected quantity of a polymeric material blended with a selected quantity of a particulate material wherein the quantity of said particulate material comprises greater than 50%, by weight, of the blend. The membrane further includes a non-fiberized polymeric matrix wherein the particulate is substantially immobilized and non-uniformly dispersed within the matrix and wherein each of the outer surfaces of the membrane includes a selectively permeable skin over the membrane interior portion. For the reasons set forth above, neither Sugiyama et al., McAllister et al. nor Anderson et al. disclose a membrane having "skin" portion.

Moreover, McAllister et al. discuss a porous membrane having a gradient porosity therethrough. The gradient porosity of the membrane in McAllister et al. is enhanced and the porosity differs from surface to surface. In McAllister et al., one side of the porous membrane may be sealed, while the other side is porous. In contrast, the membrane of Claim 44, as amended includes two outer surfaces, each of which includes a semi-permeable skin portion.

As set forth above, the membrane of Claim 44 is further directed to, among other things, a membrane wherein the particulate

material is non-uniformly dispersed within the polymeric matrix. This is clearly in contrast to the membrane described in Sugiyama et al., where uniform distribution is desired and non-uniform distribution is to be avoided. As discussed above, Sugiyama et al., achieves uniform distribution of the particulate material from one surface to the other surface.

As for Anderson et al., for the reasons set forth above, Applicants submit that Anderson et al. simply cannot be relied upon as disclosing or suggesting a "skin" portion. No support for this statement is provided in the Office Action and the rejection with respect to Anderson et al. should be withdrawn.

Applicants have also made corrections to the specification. Specifically, by this Amendment, Applicants request that certain informalities in the specification be corrected. First, for the sake of consistency, Applicants request that the abbreviation for micrometers or microns be changed from " μ " to " μm ". The abbreviation for micrometers is also being added to page 21 of the application.

On page 25, the reference to Figs. 23-25 should read Figs. 22 and 23, as Figures 24 and 25 are not photographs but graphs.

Finally, on page 25, the concentration of methylene blue should be expressed as micromolar, not micrometer.

It is submitted that these amendments to the specification

embody correction of formal matters and obvious errors and do not effect the scope of the claims or add new matter. Accordingly, allowance and entry of these amendments to the specification are also respectfully requested.

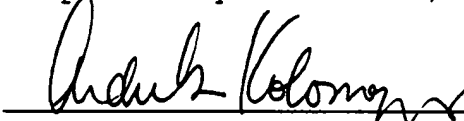
Finally, Applicants wish to call the attention of the Patent Office to recently issued U.S. Patent No. 6,099,734 (issued August 8, 2000). This patent includes the inventors of the present application (among others) and is assigned to the assignee of the present application. The application has the same filing date as the present application.

It is noted that Claim 23 of the '734 patent (and its dependent claims) is directed to a flexible composite membrane for reducing the concentration of selected organic compounds within a biological fluid. The membrane includes a selected quantity of a polymeric material and activated charcoal particles substantially immobilized within the polymeric material. The particles are non-uniformly dispersed throughout the polymeric material so as to provide a membrane with an inner portion and a selectively permeable skin. Claims 10 and 17 also refer to a membrane having a selectively permeable skin, and Claim 26 is directed to the membrane of Claim 23 wherein more of the particulate (i.e., charcoal particles) is disposed within the interior of the membrane than within the skin. Please also note that the references

primarily relied upon by the Examiner in initially rejecting these claims in the '734 patent were U.S. Patent No. 5,639,376 (Lee, et al.), 5,660,731 (Piechocki, et al.), 5,277,820 (Ash) and 5,795,483 (Ung Chhun, et al.), all of which were submitted to the Patent Office by Applicants in this application.

For the reasons set forth above, Applicants respectfully submit that all of the pending claims are now in condition for allowance or, at the very least, in better condition for appeal. Accordingly, entry of this Amendment and/or allowance of the claims are respectfully requested.

Respectfully submitted,


Andrew G. Kolomayets
Registration No.: 33,723

COOK, ALEX, McFARRON, MANZO
CUMMINGS & MEHLER, LTD.
200 West Adams Street, Suite 2850
Chicago, Illinois 60606
(312)236-8500